IUC11
EMULEX CS11/CS21 COMMUNICATIONS MULTIPLEXER DIAGNOSTIC
USER'S GUIDE

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VX9950925 Rev A
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This diagnostic distribution kit contains one of the following diagnostic distribution media:

Emulex Part Number	Type ot Media
VX9960407	TU58 Tape Cassette for VAX-11/750
VX9960507	Eight-inch flopy diskette for VAX-11/780
VX9960910	Nine-track, 1600 BPI magnetic tape for VAX-8600

This kit contains the following User's Manuals to document the programs contained on the distribution media:

Title: Emulex VAX Monitor (EVM) User's Guide
Publication Number: VX9950901

Title: CS11/V1 Communications Multiplexer Technical Manual
Publication Number: CS1151002

Title: CS11/H2 Communications Multiplexer Technical Manual
Publication Number: CS1151004

Title: CS11/U2 Communications Multiplexer Technical Manual
Publication Number: CS1151005

Title: CS11/HO Communications Multiplexer Technical Manual
Publication Number: CS1151006

Title: CS11/F1 Communications Multiplexer Technical Manual
Publication Number: CS1151007

Title: CS11/MH Communications Multiplexer Technical Manual
Publication Number: CS1151008

Title: CS11/MU Communications Multiplexer Technical Manual
Publication Number: CS1151009

Title: CS21/H2 Communications Multiplexer Technical Manual
Publication Number: CS2151003

Title:	CS21/U2 Communications Multiplexer Technical Manual
Publication Number:	CS2151004
Title:	CS21/Z1 Communications Multiplexer Technical Manual
Publication Number:	CS2151005
Title:	CS21/HL Communications Multiplexer Technical Manual
Publication Number:	CS2151011
Title:	CS21/FA/FB/FC/FD Communications Multiplexer Technical Manual
Publication Number:	CS2151012

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EMULEX PRODUCT WARRANTY

SOFTWARE WARRANTY: Emulex warrants for a period of ninety (90) days, either from the date of installation or thirty (30) days after shipment, which ever comes first, that each software package supplied shall be free from defects and shall operate according to Emulex specifications under those Digital Equipment Corporation ("DEC") operating system versions supported by Emulex. Emulex does not warrant its software products under any operating system which has not been specifically identified. Any software revisions required hereunder will cover supply of distribution media only and will not cover on-site installation of integration.

MEDIA WARRANTY: (Return to Factory) - Media not covered by on-site warranty is warranted for thirty (30) days from date of shipment. The customer is responsible for return of media to Emulex. Emulex is responsible for freight associated with replacement media being returned to the customer.

GENERAL TERMS: The above warranties shall not apply to expendable components such as fuses, bulbs, and the like, nor to connectors and other items not a part of the basic product. Emulex shall have no obligation to make repairs or to cause replacement required through normal wear and tear or necessitated in whole or in part by catastrophe, fault or negligence of the user, improper or unauthorized use of the Product, or use of the Product in such a manner for which it was not designed, or by causes external to the Product, such as, but not limited to, power failure or air conditioning. Emulex's sole obligation hereunder shall be to repair or replace items covered in the above warranties. Purchaser shall provide for removal of the defective Product, shipping charges for return to Emulex, and installation of its replacement.

RETURNED MATERIAL: Warranty claims must be received by Emulex within the applicable warranty period. A replaced product, or part thereof, shall become the property of Emulex and shall be returned to Emulex at Purchaser's expense. All returned material must be accompanied by a RETURN AUTHORIZATION number assigned by Emulex.

THE EXPRESSED WARRANTIES SET FORTH IN THIS AGREEMENT ARE IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING WITHOUT LIMITATION, ANY WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, AND ALL OTHER WARRANTIES ARE HEREBY DISCLAIMED AND EXCLUDED BY EMULEX. THE STATED EXPRESS WARRANTIES ARE IN LIEU OF ALL OBLIGATIONS OR LIABILITIES ON THE PART OF EMULEX FOR DAMAGES, INCLUDING BUT NOT LIMITED TO SPECIAL, INDIRECT, OR CONSEQUENTIAL DAMAGES ARISING OUT OF, OR IN CONNECTION WITH THE USE OR PERFORMANCE OF THE PRODUCT.

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Section 1
GENERAL DESCRIPTION

1.1 INTRODUCTION

The IUC11 Installation and Verification Diagnostic Manual is designed to serve as a guide for those using Emulex's CS11 or CS21 communication multiplexer controllers in Digital Equipment Corporation (DEC) VAX 11/7xx series computer systems. IUC11 runs under the control of Emulex VAX Monitor (EVM).

These diagnostics are designed for use by qualified installers of Emulex equipment, and thus assume that the user has some knowledge of hardware configurations, VAX architecture and terminology, and interpretation of error messages and device register contents.

This document contains three sections:

Section 1	**General Description.** This sections provides an overview of Emulex's IUC11 Installation and Verification Diagnostic, including its functions, distribution media, hardware and software requirements, and related documentation.
Section 2	**Operation.** This section describes the operation of IUC11 Installation and Verification Diagnostic, including configuration, loading and start-up procedures.
Section 3	**Service.** This section explains Emulex service policies.

1.2 PRODUCT OVERVIEW

The IUC11 Installation and Verification Diagnostic performs 29 different tests which ensure integrity and give the customer confidence in the performance of the CS11 or CS21 communications subsystem. IUC11 can test up to four CP11 distribution panels. Test descriptions appear in section 1.6.

1.3 DISTRIBUTION MEDIA

Table 1-1 lists and describes distribution media for IUC11.

Table 1-1. Distribution Media

Emulex Part Number	Type of Media
VX9960407 VX9960507 VX9960910	TU58 Tape Cassette for VAX-11/750 Eight-inch flopy diskette for VAX-11/780 Nine-track, 1600 BPI magnetic tape for VAX-8600

1.4 COMPATIBILITY

1.4.1 HARDWARE

IUC11 requires the following hardware:

- DEC VAX-11/730, 11/750, or 11/780 computer
- Emulex CS11 or CS21 communications multiplexer
- One to 64 DEC type H315 wrap-around connectors (See Appendix A)
- Unibus adapter
- 128K words of memory
- One to four CP11 distribution panels

1.4.2 SOFTWARE

IUC11 runs under the control of Emulex MicroVAX Monitor (EVM).

1.5 RELATED DOCUMENTATION

Documents listed in this subsection can be ordered from the following address:

Emulex Corporation
3545 Harbor Boulevard
Costa Mesa, CA 92626
(714) 662-5600 TWX 910-595-2521
(800) 854-7112 Outside California Only

Title:	Emulex VAX Monitor (EVM) User's Guide
Publication Number:	VX9950901
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Publication Number:	CS2151011
Title:	CS21/FA/FB/FC/FD Communications Multiplexer Technical Manual
Publication Number:	CS2151012

1.6 DIAGNOSTIC TESTS

The following is a list of the tests performed by the IUC11 Installation and Verification Diagnostic:

TEST 1 - ADDRESS ALL DH REGISTERS TEST
TEST 2 - ADDRESS ALL DM REGISTERS TEST
TEST 3 - LPR REGISTER (MOVING 1 AND 0) TEST
TEST 4 - CAR REGISTER (ALL 1 AND 0) TEST
TEST 5 - CAR REGISTER (MOVING 1 AND 0) TEST
TEST 6 - CAR MEMORY ADDRESSING TEST
TEST 7 - BCR REGISTER (ALL 1 AND 0) TEST
TEST 8 - BCR REGISTER (MOVING 1 AND 0) TEST
TEST 9 - BCR MEMORY ADDRESSING TEST
TEST 10 - BKR REGISTER (MOVING 1 AND 0)
TEST 11 - CHECK EA BITS
TEST 12 - TRANSMITTER TIMING TEST
TEST 13 - RECEIVER TIMING TEST
TEST 14 - BASIC DATA TEST
TEST 15 - SINGLE LINE DATA TEST
TEST 16 - BASIC PARITY LOGIC TEST
TEST 17 - SINGLE LINE AUTO ECHO TEST
TEST 18 - BREAK BIT TEST
TEST 19 - CHECK THAT OVERRUN SETS TEST
TEST 20 - MULTI-LINE ECHO TEST
TEST 21 - AUTO ECHO TEST, ALL SELECTED LINES CONCURRENT
TEST 22 - CHECK THAT SSR COUNTS UP TEST
TEST 23 - CHECK THAT SSR COUNTS DOWN TEST
TEST 24 - TEST SILO ALARM LEVEL TEST
TEST 25 - MODEM: CHECK LINE ENABLE TEST
TEST 26 - MODEM: CHECK CTS AND CARRIER TEST
TEST 27 - MODEM: CHECK RING TEST
TEST 28 - MODEM CHECK SECONDARY RECEIVE TEST
TEST 29 - DISPLAY CONTROLLER CONFIGURATION TEST

The diagnostic tests can be divided into four groups: general, silo, modem and configuration. The general tests (tests 1 through 21) verify the basic functionality of the multiplexer controller. The silo tests (tests 22 through 24) verify that the Silo Status Register operates properly. Tests 25 through 28 check modem operation. Test 29 displays controller configuration.

The following subsections contain detailed descriptions of the tests:

1.6.1 TEST 01 - ADDRESS ALL DH REGISTERS

This test verifies that all DH registers are addressable. It checks for the correct initialized values and performs this test on all distribution panels (up to four CP11 panels).

1.6.2 TEST 02 - ADDRESS ALL DM REGISTERS

This test verifies that the DM registers can be addressed. It checks for the correct initialized values and performs this test on all distribution panels (up to four CP11 panels).

1.6.3 TEST 03 - LPR REGISTER (MOVING 1 AND 0)

This test verifies that each bit in the LPR register can be set and cleared for all lines.

1.6.4 TEST 04 - CAR REGISTER (ALL 1 AND 0)

This test verifies that the current address register can be loaded by alternately loading all ones and then all zeros. All lines are tested.

1.6.5 TEST 05 - CAR REGISTER (MOVING 1 AND 0)

This test verifies current address for all lines by alternately shifting a single 1 bit and then a single 0 bit through the Current Address Register.

1.6.6 TEST 06 - CAR MEMORY ADDRESSING TEST

This test verifies that each location in the CAR memory can be addressed. All lines are tested.

1.6.7 TEST 07 - BCR REGISTER (ALL 1 AND 0) TEST

This test verifies that the byte count register can be loaded by alternately loading all ones and all zeros and reading the BCR. All lines are tested.

1.6.8 TEST 08 - BCR REGISTER (MOVING 1 AND 0) TEST

This test checks the byte count for all lines by alternately shifting a single 1 bit and a single 0 bit through all bit positions in the byte count register.

1.6.9 TEST 09 - BCR MEMORY ADDRESSING TEST

This test verifies that each location in the BCR memory can be uniquely addressed. All lines are tested.

1.6.10 TEST 10 - BKR REGISTER (MOVING 1 AND 0) TEST

This test checks the BKR for all lines by alternately shifting a single 1 bit and a single 0 bit.

1.6.11 TEST 11 - CHECK EA BITS

This test checks that all EA bits can be set and cleared for all lines.

1.6.12 TEST 12 - TRANSMITTER TIMING TEST

This test performs a relative timing test of all lines at all speeds.

1.6.13 TEST 13 - RECEIVER TIMING TEST

This test performs a relative timing test of all lines at all speeds.

1.6.14 TEST 14 - BASIC DATA TEST

This test performs a basic data test for 5, 6, 7 and 8-bit character lengths for all lines and reports any errors.

1.6.15 TEST 15 - SINGLE LINE DATA TEST

This test transmits and receives a binary pattern (0-377) on all selected lines and compares the transmitted and received data.

1.6.16 TEST 16 - BASIC PARITY LOGIC TEST

This test checks the odd parity function for all lines.

1.6.17 TEST 17 - SINGLE LINE AUTO ECHO TEST

This test loads test data into the silo and transmits one character at a time, reading and comparing the data in the silo. This test checks one line at a time.

1.6.18 TEST 18 - BREAK BIT TEST

This test verifies that the "break" feature works for all selected lines.

1.6.19 TEST 19 - CHECK THAT OVERRUN SETS TEST

This test verifies the ability of the diagnostic to detect an overrun in the event the silo is full. The silo holds a maximum of 64 characters.

1.6.20 TEST 20 - MULTI-LINE ECHO TEST

This test echoes a test character on one line while simultaneously echoing a binary pattern on all other selected lines.

1.6.21 TEST 21 - AUTO ECHO TEST, ALL SELECTED LINES CONCURRENTLY

This test echoes a test character on all selected lines simultaneously.

1.6.22 TEST 22 - CHECK THAT SSR COUNTS UP

This test sets the silo maintenance bit and fills the silo with a test pattern to verify that the fill level reflects the expected value.

1.6.23 TEST 23 - CHECK THAT SSR COUNTS DOWN

This test sets the silo maintenance bit, fills the silo with a test pattern and reads the characters, checking for the correct number of characters.

1.6.24 TEST 24 - TEST SILO ALARM LEVEL

This test verifies that the silo alarm level works properly when the fill level exceeds the alarm level.

1.6.25 TEST 25 - MODEM: CHECK LINE ENABLE

This test verifies that the line enable can be set and cleared.

1.6.26 TEST 26 - MODEM: CHECK CTS AND CARRIER

This test checks "Clear to Send" and "Carrier" for all lines.

1.6.27 TEST 27 - MODEM: CHECK RING

This test verifies that line enable sets if Request to Send (RTS) and Line Enable (LE) are set.

1.6.28 TEST 28 - MODEM: CHECK SECONDARY RECEIVE

This test verifies that the secondary transmit and receive lines set only for desired line.

1.6.29 TEST 29 - DISPLAY CONTROLLER CONFIGURATION

This test obtains the DH panel number, enables interrupt and checks for interrupt, and displays the configuration for that panel. It also obtains the DM panel number and performs the same interrupt procedures and displays the configuration for the modem control panel. If more than one emulation is installed, switches 1 through 5 must be set in order to run Test 29. For more information about switch settings, please refer to CS11/U2 Communications Multiplexer Technical Manual.

Section 2
OPERATION

2.1 OVERVIEW

This section describes load and start procedures and provides a sample printout of the diagnostic program run. The diagnostic displays are followed by bracketed explanations.

Operator responses to IUC11 prompts appear in **bold** print. The symbol **<return>** indicates the carriage return key.

As used in prompts, the abbreviation DEC signifies decimal radix rather than Digital Equipment Corporation. Prompts for numeric parameters include the minimum and maximum acceptable values, followed by the default value in parentheses. The following example illustrates these conventions:

```
Enter number of emulations:  [DEC - 1,4,(1)]>>>
```

For information regarding EVM command syntax, see the EVM User's Guide.

2.2 LOAD AND START PROCEDURES

2.2.1 CONFIGURATION

The sample printout of the diagnostic program run which appears in Section 2.2.3 reflects the following hardware configuration:

1. There is one controller set for base UNIBUS address **760020.**
2. The CP11 distribution panel is configured for full modem control.
3. The sample program run is set up to test only two CP11 distribution panels.
4. The default values for the program configuration are:

```
TR = 3
BR = 5
Adapter # = 0
CSR = 760020
Vector = 300
UBR = 5
Drive # = 0
```

2.2.2 LOAD PROCEDURE

The procedure used to invoke EVM varies from one VAX system to another. For a description of EVM bootstrapping procedures, see the EVM User's Guide.

After the EVM> prompt has appeared on the screen, type the following:

```
EVM>LOAD IUC11.EXE<return>
```

The LOAD statement may be followed by a SET CONFIGURATION statement, the content of which depends upon the VAX system being used. Sample configure statements for the VAX-11/730, 11-750 and 11-780 are presented in the following subsections.

2.2.2.1 Sample Configure Statement for VAX-11/730

The following example refers to a VAX-11/730 with one CS11 or CS21 at CSR address 760020 and vector 300:

```
EVM>LOAD IUC11.EXE<return>
EVM>SET CONFIG/CSR:760020/VECTOR:300<return>
```

The values shown for CSR and VECTOR are the default values and need not be entered unless the user wishes to select different default values.

2.2.2.2 Sample Configure Statement for VAX-11/750

The following example refers to a VAX/11/750 with one CS11 or CS21 at CSR address 760020, vector 300, UNIBUS adapter UBA0 (base address FC0000), and device BR level 5:

```
EVM>LOAD IUC11.EXE<return>
EVM>SET CONFIG/CSR:760020/VECTOR:300/ADAPTER:0/BR:5/UBR:5
<return>
```

The values shown for CSR, VECTOR, ADAPTER, BR and UBR are the default values and need not be entered, unless the users wishes to select different default values.

In the preceding statement, /ADAPTER needs to be specified only if it is other than UBA0: (the default). Acceptable values for ADAPTER are 0 or 1:

```
ADAPTER #0          UBA0, FC0000
ADAPTER #1          UBA1, F30000
```

BR needs to be specified only if the BR level of the UNIBUS adapter is other than 5. Acceptable values for BR are 4 through 7. Five is the default for UNIBUS adapters.

UBR needs to be specified only if the device BR level is other than 5. Acceptable values for UBR are 4 through 7. Five is the default for all UNIBUS devices.

2.2.2.3 Sample Configure Statement for VAX-11/780

The following example refers to a VAX-11/780 with the same configuration as the 11/750 in the previous example. UBA0 corresponds to TR 3:

```
EVM>LOAD IUC11.EXE<return>
EVM>SET CONFIG/CSR:760020/VECTOR:300/TR:3/BR:5/UBR:5<return>
```

In the preceding statement, /TR is optional and needs to be specified only if it is other than TR3 (UBA0). Valid values for this parameter are 3 through 6, with 3 the default:

```
TR  3        UBA0, 20100000
TR  4        UBA1, 20140000
TR  5        UBA2, 20180000
TR  6        UBA3, 201C0000
```

BR needs to be specified only if the BR level of the UNIBUS adapter is other than 5. Acceptable values for BR are 4 through 7. Five is the default for UNIBUS adapters.

UBR needs to be specified only if the device BR level is other than 5. Acceptable values for UBR are 4 through 7. Five is the default for all UNIBUS devices.

After entering the LOAD and SET CONFIGURATION statements to load and configure IUC41, the operator may start the tests as shown in the following example.

2.2.3 START PROCEDURE

The following depicts a sample printout of the diagnostic program run.

```
EVM>START<return>

Emulex CS11/21 Multiplexer Diagnostic REV Vn.m dd-mmm-yyyy
hh:mn:ss

SYSTEM ID = 00000001, VAX-11/780

Enter number of emulations:  [DEC - 1,4,(1)]>>>2<return>
```

[Select the number of panels connected to the controller. Entering **<return>** selects the default value of 1.]

```
      Lines currently selected for test:

      Number        Mask       Number(s)
        0           FF7A(X)    15,14,13,12,11,10,9,8,6,5,4,3,1
        1           FFFF(X)    15,14,13,12,11,10,9,8,7,6,5,4,3,2,1,0
        2           0000(X)
        3           0000(X)
```

[The diagnostic lists the panels and the lines currently selected for test. A mask of FFFF selects all 16 lines of an emulation. Although the line numbers appear in descending order from left to right, on the distribution panel the lines are numbered in ascending order (left to right).]

```
      Change selected lines [Y,N,(N)]>>><return>
```

[Respond with **Y** if you wish to change the line selection for any panel. **N** is the default value.]

```
      Local loopback enabled [Y,N,(N)]>>><return>
```

[To select internal loopback mode, enter **Y**. **N** is the default value. All tests, except tests 25 through 28, run in the internal loopback mode. If internal loopback mode is selected, IUC11 skips tests 25 through 28. DEC type H315 type wrap-around test connectors are required when testing in the external loopback mode.]

```
-----> BEGINNING OF PASS 1

TEST # 1 Address all DH registers dd-mmm-yyyy hh:mm:ss
                                  .
                                  .
                                  .
TEST # 29 Display controller configuration dd-mmm-yyyy hh:mm:ss
      Emulex CS11/CS21 Communications Multiplexer has the extended
      silo disabled.

      Panel   LUN       DH csr    DH vector    DM csr    DM vector
        0       0       160220    300(R)
        0       0       160220    304(T)
        1       2       160240    320(R)
        1       2       160240    324(T)
        0       1                                 170700    310
        1       3                                 170720    330

-----> END OF PASS 1

SUMMARY REPORT:
      TOTAL # ERRORS = 0 (0 SYSTEM, 0 DEVICE)
      dd-mmm-yyyy hh:mm:ss
EVM>
```

[As each test is successfully completed, IUC11 prints out the test name, date and time. Test 29 displays the controller configuration. Should a test fail to complete successfully, IUC11 identifies the type of error (either hard error or system error) and also provides a summary report of errors encountered at the end of the test run. IUC11 continues to execute the entire series of tests until the user stops the program by typing **Control C** or **Control P** or until a critical system error occurs. In such a case the program will abort and return to EVM.]

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Section Three
SERVICE

Emulex thoroughly tests its products. If IUC11 indicates a malfunction of the CS11/CS21 communications subsystem or if you have trouble with IUC11 itself, contact Emulex or its representative.

In the continental United States, Alaska, and Hawaii contact:

Emulex Technical Support
3545 Harbor Boulevard
Costa Mesa, CA 92626
(714) 662-5600 TWX 910-595-2521
(800) 854-7112 Outside California Only

Outside the United States, contact the distributor from whom the product was initially purchased.

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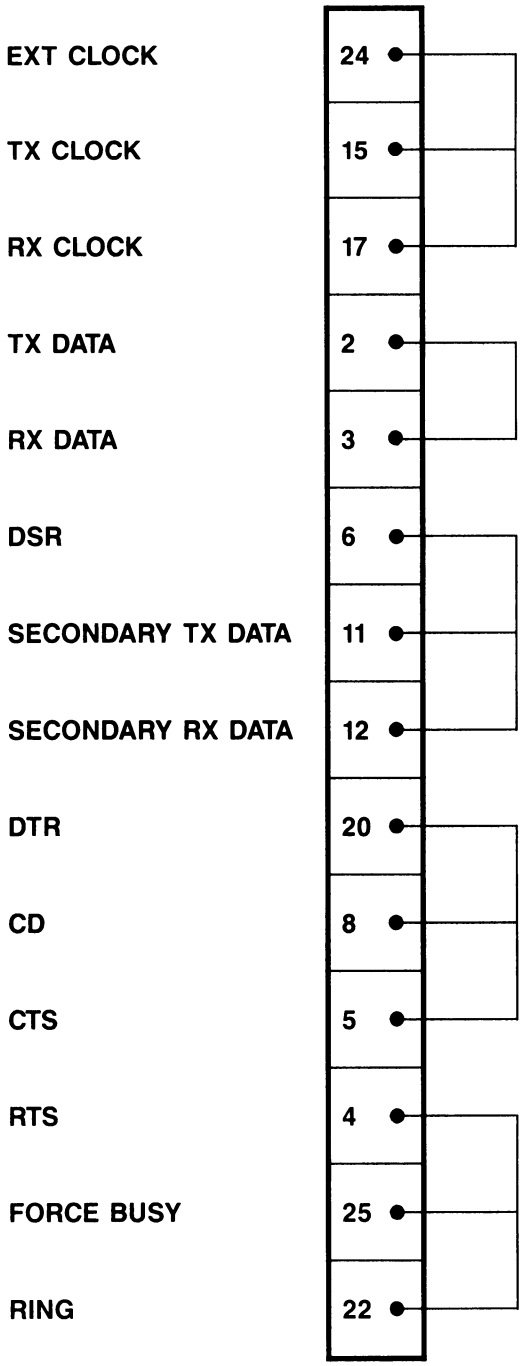

Figure A-1. DEC H315 Connector

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